

REMARKS

This Amendment is submitted in response to the non-final Office Action mailed on May 12, 2009. No fee is due in connection with this Amendment. The Director is authorized to charge any additional fees which may be required, or to credit any overpayment to Deposit Account No. 02-1818. If such a withdrawal is made, please indicate the Attorney Docket No. 112857-518 on the account statement.

Claims 11-12, 14-18 and 20-21 are pending in this application. Claims 1-10, 13 and 19 were previously canceled without prejudice or disclaimer. In the Office Action, Claims 16 and 20 are objected to. Claims 11-12, 14-18 and 20-21 are rejected under 35 U.S.C. §103. In response, Claims 11, 16, 18 and 20 have been amended and Claims 22-23 have been newly added. The amendments do not add new matter. The newly added claims do not add new matter. At least in view of the amendments and/or for the reasons set forth below, Applicant respectfully submits that the objections and rejections should be withdrawn.

In the Office Action, Claims 16 and 20 are objected to due to informalities. With respect to Claim 16, the Patent Office asserts that the claim is missing the term "the" before "intermediate layer." See, Office Action, page 2, line 13. In response, Applicant has amended Claim 16 to recite "the intermediate layer." This amendment does not add new matter. The amendment is supported in the Specification at, for example, page 2, paragraph 12; page 6, paragraph 65, lines 1-13; page 7, paragraph 72, lines 5-13; paragraphs 73-75; page 10, paragraph 92. Thus, Applicant respectfully submits that the informality cited by the Patent Office has been corrected with respect to Claim 16.

With respect to Claim 20, the Patent Office Asserts that the phrase "the blue light emitting layer" lacks antecedent basis. See, Office Action, page 2, lines 14-15. However, Applicant respectfully submits that the first appearance of the term "blue light emitting layer" in independent Claim 20 is preceded by the term "a." For example, Claim 20 recites, in part, "a plurality of light emitting layers including a red light emitting layer, a green light emitting layer, and a blue light emitting layer." As such, Applicant respectfully submits that the phrase "the blue light emitting layer" in Claim 20 has proper antecedent basis.

Accordingly, Applicant respectfully requests that the objections to Claims 16 and 20 be withdrawn.

In the Office Action, Claims 11-12, 14-18 and 20 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Publication No. 2004/0032214 A1 to Lee et al. ("*Lee*") in view of U.S. Patent Publication No. 2004/0012331 A1 to Yamazaki et al. ("*Yamazaki*"). In response, Applicant has amended independent Claims 11, 18 and 20. At least in view of the amendments and/or for the reasons set forth below, Applicant respectfully submits that, even if combinable, the cited references fail to disclose or suggest each and every element of independent Claims 11, 18 and 20.

Currently amended independent Claims 11 and 18 recite, in part, an organic EL device comprising: a plurality of light emitting layers including a red light emitting layer, a green light emitting layer, and a blue light emitting layer laminated in respective order between an anode and a cathode, wherein the green light emitting layer comprises a hole transporting material and an electron transporting material. Similarly, currently amended independent Claim 20 recites, in part, an organic EL device comprising: an anode; a hole transport layer formed on the anode; a plurality of light emitting layers including a red light emitting layer, a green light emitting layer, and a blue light emitting layer laminated in respective order on the hole transport layer such that the red light emitting layer is formed in contact with the hole transport layer; an electron transport layer formed on the blue light emitting layer; a cathode formed on the electron transport layer; and an intermediate layer, wherein the green light emitting layer comprises a hole transporting material and an electron transporting material.

These amendments do not add new matter. The amendments are supported in the Specification at, for example, page 2, paragraph 29; page 3, paragraphs 30-31, 35-37 and 41; page 4, paragraph 47, lines 1-4; paragraphs 48-49; page 5, paragraph 50, lines 17-23; paragraphs 52, 58 and 61; page 6, paragraph 70, lines 11-28; page 7, paragraph 77, lines 1-14; paragraph 78, lines 13-18; page 8, paragraphs 83-84; page 9, paragraph 85, lines 1-5; paragraph 86, lines 4-7; paragraph 87; page 10, paragraphs 88-89; paragraph 92, lines 1-7; Figs. 1-2. By providing an organic EL device with the claimed configuration, the present claims provide a better balance of luminous intensities in the blue, green and red wavelength regions. See, Specification, page 1, paragraphs 4-7; page 2, paragraphs 12 and 14. In contrast, the cited references fail to disclose or suggest every element of the presently pending claims.

For example, the cited references fail to disclose or suggest a green light emitting layer that comprises a hole transporting material and an electron transporting material as recited, in

part, by independent Claims 11, 18 and 20. The Patent Office asserts that *Lee* discloses a green light emitting layer having a hole transporting property and an electron transporting property. See, Office Action, page 3, lines 9-10. In a previous Office Action, the Patent Office argued that Alq3, the only green light emitting material disclosed in *Lee*, although recognized in the art for its electron transporting property, must necessarily also include a hole transporting property in order for the device of *Lee* to operate. See, Final Office Action dated December 10, 2008, page 7, lines 1-15. Specifically, the Patent Office asserted that “[i]f the green light emitting layer (49) [of *Lee*] did not have a hole transporting property, no holes would be supplied to the red light emitting layer (50) and the device of *Lee* would be inoperable.” See, Final Office Action dated December 10, 2008, page 7, lines 10-12. However, the portion of *Lee* relied on by the Patent Office merely discloses that a blue light emitting layer is formed on a hole transporting layer, a controlling layer is formed on the blue light emitting layer, and green and red light emitting layers are respectively formed on the controlling layer, and that such elements “prepared according to the above examples emitted an adequate white light.” See, *Lee*, page 3, paragraphs 41-42. Nowhere does *Lee* disclose that holes must be transported through the green light emitting layer to the red light emitting layer in order to emit light.

Instead, Applicant respectfully submits that, contrary to the Patent Office’s assertion, the device of *Lee* would be operable, albeit less efficient, if its green light emitting layer only had an electron transporting property. For example, the present Specification explains that if the green light emitting layer has a hole transporting property, this merely ensures that some of the holes injected through the red light emitting layer “contribute” to light emission in the green and blue light emitting layers. See, Specification, page 4, paragraph 47, lines 4-8. This suggests that the holes are not the only source of light emission in the green and blue light emitting layers. Furthermore, nowhere do *Lee* or the present Specification disclose that the holes must be transported through the green light emitting layer to the light emitting layer furthest from the hole injecting layer in order for the device to function properly. Light emission occurs when holes and electrons recombine in a light emitting layer. As such, both holes and electrons are necessary to cause light emission. However, despite this, *Lee* discloses using a controlling layer between the light emitting layers which has an electron blocking property. See, *Lee*, Abstract, lines 12-15; Figs. 3-4D. As such, *Lee* itself teaches that it is not necessary to transport the holes and the electrons through all of the light emitting layers using materials in the organic layers in

order to obtain emission. Applicant thus respectfully submits that the device of *Lee* cannot be inoperable merely because the green light emitting layer does not have both a hole transporting property and an electron transporting property.

Furthermore, even if the Patent Office's assertion is correct that the Alq3 green light emitting layer of *Lee* has some minimal hole transporting property, Applicant respectfully submits that *Lee* fails to disclose a green light emitting layer which comprising a hole transporting material and an electron transporting material. As admitted by the Patent Office, Alq3 is widely recognized in the art for its electron transporting properties. See, Final Office Action dated December 10, 2008, page 7, lines 1-2. As such, one of ordinary skill in the art would recognize Alq3 as an electron transporting material. See, Specification, page 5, paragraph 59, lines 1-3. Furthermore, currently amended independent Claims 11, 18 and 20 now require two materials, rather than merely two properties, in the green light emitting layer. As the Patent Office admits, *Lee* merely discloses one material in its green light emitting layer, the electron transporting material Alq3. See, *Lee*, page 3, paragraph 40, lines 3-6. Nowhere does *Lee* disclose or suggest doping or otherwise combining the Alq3 with another material to obtain a green light emitting layer with both strong electron and hole transporting properties, nor does the Patent Office cite support for such claimed element. Therefore, *Lee* fails to disclose or suggest a green light emitting layer that comprises a hole transporting material and an electron transporting material as required, in part, by the present claims. The Patent Office relies on *Yamazaki* merely for the disclosure of the claimed arrangement of light emitting layers from the cathode to the anode. See, Office Action, page 3, lines 11-16. Nowhere does *Yamazaki* disclose a green light emitting layer including a hole transporting material and an electron transporting material, nor does the Patent Office cite support for such claimed element. As such, Applicant respectfully submits that the cited references fail to disclose a green light emitting layer that comprises a hole transporting material and an electron transporting material in accordance with the present claims.

Moreover, the cited references fail to disclose a plurality of light emitting layers including a red light emitting layer, a green light emitting layer, and a blue light emitting layer laminated in respective order between an anode and a cathode as required, in part, by independent Claims 11 and 18. The Patent Office asserts that merely because *Yamazaki* discloses selecting a plurality of light emitting layers to generate white light, the color order of the light emitting layers is independent of the cathode/anode arrangement. See, Office Action,

page 3, lines 13-16. However, the portion of *Yamazaki* relied on by the Patent Office merely discloses that “it is possible to obtain white [*sic*] luminescence by *properly selecting* the materials of the respective light emitting layers 12a-12c and placing the layers 12a-12c on top of one another to mix the colors of these layers.” See, *Yamazaki*, page 4, paragraph 52. However, nowhere does *Yamazaki* disclose or suggest that the *proper* method of selecting the materials includes laminating the red light emitting layer on the anode. In fact, the Patent Office has failed to cite a single reference disclosing laminating the red, green and blue light emitting materials in respective order from the anode to the cathode.

Furthermore, contrary to the Patent Office’s assertion that the lamination order of the colors is independent of the anode/cathode arrangement, the present Specification expressly teaches that the properties of the light emitting materials are dependent on the lamination order of the colors with respect to the anode/cathode. For example, the present Specification teaches that if the red, green and blue light emitting layers are laminated in this order from the anode to the cathode, the intermediate layer should have a hole transporting and an electron blocking property. See, Specification, page 5, paragraph 62, lines 1-10. However, the Specification further teaches that if a reverse lamination order is adopted, “the electron transporting property of each of the light emitting layers is also changed.” See, Specification, page 7, paragraph 77, lines 1-9. Specifically, the Specification teaches that if a reverse lamination order is adopted, the intermediate layer has both an electron transporting and a hole blocking property. See, Specification, page 7, paragraph 78, lines 8-10. In direct contrast to the Specification and present claims, *Lee* teaches that a reverse lamination order is employed, in which the blue, green and red light emitting layers are laminated in this order from the anode to the cathode, along with an intermediate layer having a hole transporting and an electron blocking property. See, *Lee*, page 1, paragraphs 12 and 14; page 2, paragraph 33; page 3, paragraph 40; Figs. 3 and 4A-4D. Thus, Applicant respectfully submits that the combination of *Lee* and *Yamazaki* fails to disclose a plurality of light emitting layers including a red light emitting layer, a green light emitting layer, and a blue light emitting layer laminated in respective order between an anode and a cathode as required, in part, by independent Claims 11 and 18 and Claims 12 and 14-17 that depend therefrom.

For at least substantially the same reasons, Applicant respectfully submits that the cited references fail to disclose or suggest a plurality of light emitting layers including a red light emitting layer, a green light emitting layer, and a blue light emitting layer laminated in respective order on the hole transport layer as required, in part, by independent Claim 20.

Accordingly, Applicant respectfully requests that the rejection of Claims 11-12, 14-18 and 20 under 35 U.S.C. §103(a) to *Lee* and *Yamazaki* be withdrawn.

In the Office Action, Claim 21 is rejected under 35 U.S.C. §103(a) as being unpatentable over *Lee* in view of *Yamazaki* and further in view of U.S. Patent Publication No. 2002/0197511 A1 to D'Andrade et al. ("*D'Andrade*"). Applicant respectfully submits that, even if combinable, the cited references fail to disclose or suggest each and every element of Claim 21.

As discussed previously, *Lee* and *Yamazaki* fail to disclose or suggest: (1) a green light emitting layer that comprises a hole transporting material and an electron transporting material; and (2) a plurality of light emitting layers including a red light emitting layer, a green light emitting layer, and a blue light emitting layer laminated in respective order between an anode and a cathode as required, in part, by independent Claim 11 from which Claim 21 depends. The Patent Office relies on *D'Andrade* merely as support for using TPD and CBP as materials with hole transport and electron blocking properties. See, Office Action, page 8, lines 1-14. Thus, Applicant respectfully submits that, even if properly combinable, *D'Andrade* fails to remedy the deficiencies of *Lee* and *Yamazaki* with respect to Claim 21.

Accordingly, Applicant respectfully requests that the rejection of Claim 21 under 35 U.S.C. §103(a) to *Lee*, *Yamazaki* and *D'Andrade* be withdrawn.

Applicant further notes that Claims 22-23 have been newly added. The new Claims are fully supported in the Specification at, for example, page 1, paragraph 8, lines 1-12 and 25-31; page 7, paragraphs 77-78. No new matter has been added thereby. Applicant respectfully submits that the subject matter as defined in the newly added claims is patentable over the cited art for at least substantially the same reasons as discussed above.

Specifically, with respect to Claim 22, Applicant respectfully submits that the cited references fail to disclose an organic EL device wherein the HOMO-LUMO energy gap of the intermediate layer is greater than a HOMO-LUMO energy gap of all of the materials constituting the light emitting layers disposed adjacent to the intermediate layer. For example, the Patent Office relies on *Lee* for disclosure of the claimed intermediate layer. See, Office Action, page 3,

lines 6-9. However, *Lee* merely discloses a controlling layer of α -NPD adjacent to DPVBi as a blue light emitting layer and Alq3 as a green light emitting layer. See, *Lee*, page 3, paragraph 40. The present Specification teaches that the HOMO-LUMO energy gaps of those materials are as follows: α -NPD = 3.0; DPVBi = 3.1; and Alq3 = 2.7. See, Specification, Fig. 6. As such, Applicant respectfully submits that the controlling layer of *Lee* does not have a greater HOMO-LUMO energy gap than all of the materials disposed adjacent to it. As such, *Lee* fails to disclose an organic EL device wherein the HOMO-LUMO energy gap of the intermediate layer is greater than a HOMO-LUMO energy gap of all of the materials constituting the light emitting layers disposed adjacent to the intermediate layer as required, in part, by Claim 22.

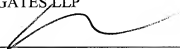
Furthermore, with respect to Claim 23, as discussed previously, *Lee* merely discloses an organic EL device including a blue light emitting layer, a green light emitting layer, and a red light emitting layer laminated in respective order between an anode and a cathode, and a controlling layer having a hole transporting and an electron blocking property. As such, *Lee* and, thus, the cited references, fail to disclose an organic EL device comprising a plurality of light emitting layers including a blue light emitting layer, a green light emitting layer, and a red light emitting layer laminated in respective order between an anode and a cathode; and an intermediate layer having an electron transporting property and a hole blocking property in accordance with independent Claim 23.

For the foregoing reasons, Applicant respectfully submits that the present application is in condition for allowance and earnestly solicits reconsideration of same.

Respectfully submitted,

K&L GATES LLP

BY



Thomas C. Basso
Reg. No. 46,541
Customer No. 29175

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